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Method and system for establishing a connection

FIELD OF THE INVENTION

5   The present invention relates to a method and system for
establishing a connection in a telecommunication network,
such as a mobile network.

BACKGROUND OF THE INVENTION

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In recent years, multimedia telephone terminals which can
be connected to fixed networks have been developed. These
terminals provide real-time video, audio, or data, or any
combination thereof, between two multimedia telephone

15   terminals over a voice band network connection.
Communication may be either one-way or two-way. A
multipoint communication using a separate Multipoint
Control Unit (MCU) among more than two terminals is also
possible. Furthermore, the multimedia telephone terminals

20   can be integrated into PCs or work stations, or can be
stand-alone units.

Interworking with such visual telephone systems on mobile
radio networks is defined in the ITU-T video/multimedia

25   recommendation H.324/M.

However, in general, a calling party does not know in
advance whether or not the terminal of a called party
supports the connection type underlying a desired call.

30   Thus, inconvenient error processings and disconnections may
occur, if the terminal of the called party does not support
the desired connection type, e.g. the multimedia
connection.

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SUMMARY OF THE INVENTION

It is therefore an object of the present invention to
provide a method and system for establishing a connection,
by means of which error processings and disconnections due
to a capability mismatch can be prevented.

This object is achieved by a method for establishing a
first type of connection in a telecommunication network,
comprising the steps of:
performing a handshake processing with a called party of
said first type of connection;
determining a second type of connection;
checking the result of the handshake processing; and
establishing the second type of connection, when the result
of the checking step indicates that the handshake
processing was not successful.

Furthermore, the above object is achieved by a system for
establishing a first type of connection in a
telecommunication network, comprising:
negotiating means for performing a handshake processing
with a called party of the first type of connection;
determining means for determining a second type of
connection;
checking means for checking the result of the handshake
processing; and
connection control means for establishing the second type
of connection in response to the checking result of the
checking means.

Accordingly, a fallback solution is provided, wherein a
fallback connection, i.e. the second type of connection, is
determined, such that another type of connection supported

by the called party or another connection to another service, such as a speech service, can be established without disconnecting the calling party or performing a time-consuming error processing or messaging at the end terminals.

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The determination of the second type of connection may be achieved based on a monitoring operation performed in a network element arranged between the calling party and the called party. The network element may then perform a connection fallback from the first type of connection (e.g. multimedia call) to the second type of connection (e.g. speech call).

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Alternatively, the network element may determine as the second type of connection at least one type of connection supported by the called party, by monitoring a signaling for call establishment, wherein the call to the called party is then re-established as a connection of the supported type. The determination result may be signaled to the calling party which then performs the call re-establishment operation. Thereby, the risk of clearing the call due to a long waiting period can be removed.

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Preferably, the network element is an interworking unit of the telecommunication network.

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The first type of connection, which can be a multimedia connection, is established, when the result of checking indicates that the handshake processing was successful, i.e. that the other party supports the first type of connection.

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Preferably, the handshake processing is an interworking processing which may be performed by an interworking function provided at a mobile switching center of a mobile network.

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The first type of connection may be a video connection, and may be established between a mobile terminal of a mobile network and a network terminal of a fixed network.

10   The second type of connection can be determined on the basis of the handshake processing, or by performing another handshake processing with the other party. Alternatively, the second type of connection can be determined on the basis of the calling number of the other party. Moreover,

15   the second type of connection may be determined on the basis of a predetermined priority order. The second type of connection may be a speech connection or any other type of connection, e.g. a multimedia or video connection, supported by the called party.

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Initially, an HSCSD (High Speed Circuit Switched Data) call may be established to the other party. Then, the other party may reply by transmitting a request for the first type of connection.

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Furthermore, the second type of connection can be established by performing a channel mode modification and changing the switching at a switching means.

30   Preferably, the apparatus for establishing the first type of connection is a mobile switching center, wherein the negotiating means corresponds to an interworking function provided at said mobile switching center.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following, the present invention will be described in greater detail on the basis of a preferred embodiment with reference to the accompanying drawings, in which:

Fig. 1 shows a principle block diagram of a mobile network connected to a fixed network 4,

Fig. 2 shows a principle block diagram of a mobile switching center according to the preferred embodiment of the present invention,

Fig. 3 shows a flow diagram of a procedure for establishing a mobile-originated multimedia connection according to the preferred embodiment of the present invention,

Fig. 4 shows a flow diagram of a procedure for establishing a mobile-terminated multimedia connection according to the preferred embodiment of the present invention, and

Fig. 5 shows a flow diagram of an alternative procedure for establishing a multimedia connection based on a call retry procedure according to the preferred embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the following, the present invention will be described on the basis of a preferred embodiment which relates to a

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multimedia connection between a fixed network 4 and a
mobile network, as shown in Fig. 1.

According to Fig. 1, a multimedia end terminal (TE 5) is
5   connected via the fixed network 4, such as a Public
Switched Telephone Network (PSTN) or the like, to a mobile
terminal or mobile station (MS 1) having a multimedia
capability. The MS 1 is radio-connected to a Base Station
Subsystem (BSS) 2 which is connected to a Mobile Switching
10   Center (MSC/IWF) 3 having an interworking function. The
interworking function is provided for adapting protocol
features of the mobile network to protocol features of the
fixed network 4.

15   According to the present invention, the MSC/IWF 3 is
arranged to determine an auxiliary connection or fallback
connection which is established in case the other party
does not support a multimedia call.

20   Fig. 2 shows a principle block diagram of the MSC/IWF 3
according to the preferred embodiment of the present
invention. According to Fig. 2, the MSC/IWF 3 comprises a
switch 31 for performing a switching operation between the
BSS 2 and the fixed network 4, so as to establish a
25   requested connection. The switching operation of the switch
31 is controlled by a connection control unit 34 arranged
to control the setup and establishment of the switched
connections.

30   Furthermore, the MSC/IWF 3 comprises an interworking
function (IWF) 32 which provides an interoperation with
multimedia end terminals, such as the TE 5, over the fixed
network 4. It is arranged to perform a transcoding, an
error processing adaptation and a rate matching between the

mobile network and the fixed network 4. Furthermore, the
IWF 32 performs the negotiation processing in order to set
up a voice band channel to the fixed network 4.

5   According to the preferred embodiment, the IWF 32 is
connected to a fallback control unit 33 which is arranged
to check the result of the negotiation performed by the IWF
32 and to control the connection control unit 34, so as to
establish one of a multimedia connection and a fallback
10   connection in response to the checking result.

In the following, a processing performed by the MSC/IWF 3
in order to establish a mobile-originated multimedia
connection is described with reference to Fig. 3.

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Initially, the MS 1 requests a multimedia call, e.g. a
H.324 call, and transmits a corresponding setup message to
the MSC/IWF 3, which is received by the MSC/IWF 3 in step
S101. The type of the requested call may be indicated e.g.
20   in the Bearer Capability Information Element (BCIE) of the
setup message.

Based on the received setup message, the MSC/IWF 3 checks
the multimedia call, and the IWF 32 reserves the required
25   interworking function resources and starts a handshake or
negotiation processing with the fixed network 4 in order to
set up the multimedia connection to the called party, e.g.
the TE 5 (step S102). In particular, the negotiation
processing may be a ITU-T V.8, V.8bis or V.140 procedure or
30   the like.

Then, the fallback control unit 33 checks in step S103
whether the negotiation performed by the IWF 32 was
successful, or not.

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In case the fallback control unit 33 determines in step
S103 that the negotiation was successful, it controls the
connection control unit 34, so as to connect the multimedia
call via the switch 31 (step S104). Thus, a connection such
as a modem or UDI (Unrestricted Digital Information)
connection is established between the IWF 32 and the called
party, e.g. the TE 5.

If the fallback control unit 33 determines in step S103
that the negotiation was not successful, i.e. that the
called party does not support the multimedia call, it
triggers a fallback to another type of connection (step
S105). The other type of connection may be determined on
the basis of the negotiation performed by the IWF 32, or on
the basis of an additional negotiation of the IWF 32, or on
the basis of a default setting (e.g. fallback service such
as speech), initiated by the fallback control unit 33.

Subsequently, the connection control unit 34 is controlled
to perform a fallback procedure to change the actual call
to another service, i.e. to switch the connection between
the MS 1 and the MSC/IWF 3 to another service such as a
speech service (step S106). This may be achieved by a
channel mode modification of the channel between the MS 1
and the MSC/IWF 3, and a corresponding release of resources
of the IWF 32, followed by a change of the switching
performed by the switch 31 in the MSC/IWF 3. Finally, the
call is connected via the fallback connection (step S107),
such that the MS 1 is connected to an auxiliary or fallback
service without disconnecting it or performing a time-
consuming error processing or messaging.

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In the following, an establishment of a mobile-terminated
multimedia connection is described with reference to Fig.
4.

5   Initially, a setup message, e.g. an Initial Address Message
(IAM) is received by the MSC/IWF 3 from a multimedia
terminal, e.g. the TE 5, of the fixed network 4 (step
S201). Based on the received initial address message and a
subscriber related service information possibly stored in
10 the Home Location Register (HLR) of the mobile network, the
MSC/IWF 3 or the IWF 32 checks the multimedia call and the
MSC/IWF 3 transmits a call setup message to the MS 1 via
the BSS 2 (step S202). In particular, the call may be first
established as a HSCSD (High Speed Circuit Switched Data)
15 call, in order to provide a fast setup processing.

The setup message from the MSC/IWF 3 to the MS 1 may not
contain a service definition at all, e.g. in case where a
single numbering scheme is used and the setup message from
20 the fixed network 4 does not contain any service
definition.

Then, the MS 1 replies by transmitting a request message
for a multimedia call, e.g. a H.324 call, wherein the
25 requested call type may depend on the received calling
number. Then, the MSC/IWF 3 receives the request message
for the multimedia call in step S203 and controls the IWF
32, so as to reserve the corresponding interworking
function resources, and to start a corresponding handshake
30 or negotiation processing, e.g. V.8, V.8bis or V.140
negotiation or H.245-H.223 messages, with the called party
of the fixed network 4 (step S204).

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Then, the fallback control unit 33 checks whether the
negotiation performed by the IWF 32 was successful, or not
(step S205). In case the negotiation was successful, the
fallback control unit 33 controls the connection control

5   unit 34 so as to establish a multimedia connection via the
switch 31 to the called party.

If the fallback control unit 33 determines that the
negotiation was not successful, it triggers a fallback

10   connection to another type of connection supported by the
called party (step S207). The fallback connection is
determined based on the dialled number of the called party
or may be obtained as described in connection with the
mobile-originated connection establishing according to Fig.

15   3.

Based on the determined fallback connection, the connection
control unit 34 performs a fallback procedure in step S208,
in order to change the call to another service

20   corresponding to the fallback connection. Finally, the call
is connected to the fallback connection (step S209) and the
mobile-terminated call is established without any
disconnection or error processing at the respective end
terminals.

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However, the above described fallback to a speech
connection may lead to the problem that the far end party
(e.g. the TE 5) has to wait for several seconds while the
MSC/IWF 3 is detecting or checking the capabilities of the

30   far end terminal. Thus, the far end party may clear the
call "as a failure" during this waiting period. Such a
rejection of the call setup and clearing of the call incurs
a so-called cause code to be sent the MS 1 to thereby
inform the user of the cause of the problem.

In the following, a call retry procedure by which the above problem can be prevented is described with reference to Fig. 5.

5   Initially, the MS 1 requests a multimedia call, e.g. a H.324 call, and transmits a corresponding Initial Address Message (IAM) to the MSC/IWF 3 (step S101). The IAM is received by the MSC/IWF 3 in step S302.

10   Based on the received IAM, the MSC/IWF 3 performs a call setup procedure (S303) and the IWF 32 reserves the required interworking function resources and starts the handshake or negotiation processing with the fixed network 4 in order to

15   set up the multimedia connection to the called party, e.g. the TE 5 (step S304).

Then, the fallback control unit 33 checks in step S305 whether the negotiation performed by the IWF 32 was

20   successful, or not.

In case the fallback control unit 33 determines in step S305 that the negotiation was successful, it controls the connection control unit 34, so as to connect the multimedia

25   call via the switch 31 (step S306).

If the fallback control unit 33 determines in step S305 that the negotiation was not successful, i.e. that the called party does not support the multimedia call, it

30   determines a call type supported by the called party (S307). The supported call type or types may be determined by monitoring and analyzing the initial inband or outband signaling for setup negotiation between the IWF 32 and the called party.

The result of the analysis, i.e. an information what the
far end party can support, is then transmitted to the MS 1
in order to inform the calling party of the call type(s)
5   supported by the called party (step S308). This transmittel
may be performed by using the existing cause code mechanism
and defining corresponding new parameter values.

Having received this information in step S309, the MS 1
10   initiates a call retry procedure based on the received
information, e.g. using the new parameter values known to
be supported by the far end party. Thus, the MS 1 performs
a call establishment for a call type indicated as being
supported by the called party (step S310). Thereby, in all
15   propability, a successful call retry will be achieved.

As an alternative, the result of the above analysis of the
supported call type(s), the network itself (e.g. the
MSC/IWF 3) may perform the call retry towards the far end
20   party. This may be achieved by providing a corresponding
retry procedure in the IWF 32, which is initiated by the
fallback control unit 33 and based on the new parameters
obtained as a result of the analysis.

25   The retry mechanism may cover both network
incompatibilities (e.g. UDI requested, but only RDI
(Restricted Digital Information) or 3.1 kHz supported by
the network; or RDI requested, but only 3.1 kHz supported
by the network) and far end terminal incompatibilities
30   (e.g. UDI/RDI requested, but only 3.1 kHz or speech
supported by the far end terminal; or 3.1 kHz requested,
but only speech supported by the far end terminal).

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Hence, the called party does not have to wait uninformed or uncertain for something to happen. Actually, the waiting is done by the calling party during the "alerting period" of the call setup, which removes the risk of clearing the call
5   before it has really started.

It is to be noted, that the processing performed by the MSC/IWF 3 may be implemented by a control program of a microprocessor such as a CPU, wherein the respective blocks
10   33 and 34 are replaced by corresponding software features provided in a ROM allocated to the CPU.

Furthermore, the connection establishment processing described in the above preferred embodiment can be
15   performed in any telecommunication network to which terminals supporting different types of connections are connected, and is not restricted to a mobile switching center of a mobile network. Moreover, the fallback connection (i.e. second type of connection) is not
20   restricted to a speech connection, but can be a multimedia connection or any type of connection supported by the called party.

Furthermore, the determination of the fallback connection
25   may be performed by a combination of the above described possibilities, and a predetermined priority order may be allocated in case a plurality of fallback connections are determined.

30   The above description of the preferred embodiment and the accompanying drawings are only intended to illustrate the present invention. The preferred embodiment of the invention may vary within the scope of the attached claims.

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In summary, the present invention relates to a method and system for establishing a connection, wherein a handshake processing is performed with the other party to establish a first type of connection. If the handshake processing is

5   successful, the first type of connection is established. If the handshake processing is not successful, i.e. the other party does not support the first type of connection, a fallback procedure is started to change the call to a second type of connection determined during the connection

10   establishment. The change to the second type of connection may be performed directly or may be based on a call retry procedure. Thereby, inconvenient disconnections or error processings at the end terminals can be prevented.

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